Documentation
for
shef_decode_raw, OB4 release
September 12, 2004

1.0 General Information

The primary method of getting data into the RFC Archive database, particularly raw data, is via SHEF messages decoded by the shef_decode_raw application. This program is run continuously in the background by the user *oper*, and is fed SHEF products in parallel with the IHFS database's SHEF decoder on the AWIPS ds system. Additionally, SHEF messages from metar, ldad, and WAN sources are fed into the archive system by placing them in the same queue as the SBN SHEF messages. The application is written in Fortran and esql/C.

1.1 Design Considerations

There have been numerous reported problems with the version 1 release of the archive SHEF decoders. After reviewing the problems and possible solutions at the Nov 17-18, 2003 RAXUM team meeting, the team recommended that the archive SHEF decoders be rewritten using the national operational (IHFS) SHEF decoder as the starting point. A natural product of this change would be log output which is more consistent with that produced by the IHFS decoder, a feature which many RFCs desired.

This recommendation was reviewed by OHD management in January 2004. A "re-design" review conference call in early February produced the following decisions:

- there will continue to be two rfc archive SHEF decoders (raw and processed),
- both decoders will use the same parser as the IHFS SHEF decoder,
- the format of the log files (daily and product) will be changed to be similar to the log files of the IHFS SHEF decoder, and
- the incoming directory for the shef_decode_raw will remain on the ds and be mounted to the rax, while the shef_decode_processed incoming directory will remain on the rax with no mount back to the ds.

1.2 Enhancements/Bug Fixes/Changes

Build OB4

Enhancements
See section 1.1 about the changes.

Bug Fixes

The following bug reports should be addressed by this new version of the application:

- r1-3 -- It has been reported that the shef_decode_raw program is running very slowly at two sites.
- r1-4 -- The raw decoder stopped working when a large number of metar2shef files (>400) were placed in the ds /data/fxa/ispan/hydro_adbs directory.
- r1-6 -- Both the shef_decode_raw and shef_decode_pro programs end unexpectedly.

Changes

- changes in apps_defaults tokens
- eliminated the use of the nohup command in start script, nohup.out file is replaced with output being redirected into files raw.out and raw.err.
- changed from using the inputparm file to the SHEFPARM file for the definitions of valid SHEF pedrsep codes
- eliminated the cfg file and and command line options feature
- the start and stop scripts were modified

1.3 Known Limitations/Bugs

The OB4 release will not address the problems described by the following bug reports:

- R1-19: The shefdecoder(s) need to be able to write to ALL the SHEF data value tables. The limitation in the version 1 release is not acceptable.... need to ensure these tables are written to: commentvalue, pemrsep, pempsep, pehfseip and peqfsep.
- R1-23; Recently discovered in May 2004, the poster for the unkstnvalue table does not always properly define the idur field of the data row it is currently inserting.
- R1-24: Recently discovered in May 2004, the shefdecoders, raw and processed, do not enforce the SHEF revision flag.

2.0 Configuration Information

2.1 Apps_defaults Tokens

An excerpt from the .Apps_defaults file follows. This list shows the tokens that are used by this SHEF decoder.

```
adb_name       : adb_ob4rha    # archive database name
adb_server     : adbs          # archive server name
adb_dir        : /rfc_arc                    # Base RFC Archive Directory
adb_raw_que    : /rfc_arc_data/q/raw/        # pathname for raw q input
                                             # directory
adb_bin_dir    : $(adb_dir)/bin              # pathname for the bin directory
adb_cfg_dir    : $(adb_dir)/cfg              # pathname for the config
                                             # directory
adb_lib_dir    : $(adb_dir)/lib              # pathname for the lib directory
adb_logs_dir   : $(adb_dir)/logs         # pathname for the logs directory
```

```
adb_scripts_dir: $(adb_dir)/scripts    # pathname for the scripts directory
adb_shef_winpast   : 10    # number of days in past to post data
adb_shef_winfuture : 30    # number of minutes in future to post obs data
shefdecode_rax_userid  : oper    # controlling UNIX user
adb_shefdecode_input   : $(adb_cfg_dir)/decoders  # RAX SHEF parameter file
                                                  # location
adb_shef_raw_logs_dir   : $(adb_logs_dir)/decoder/raw/logs
                          # pathname for the  daily logs directory
adb_shef_raw_err_dir   : $(adb_logs_dir)/decoder/raw/err
                         # pathname for the #product logs directory
adb_shef_raw_keeperror : IF_ERROR          # keep files (=ALWAYS) or only
                                           # when errors occur (=IF_ERROR)
adb_shef_raw_post_unk  : IDS_AND_DATA
                                  # NONE - do not post to the UnkStnValue table
                                  # IDS_AND_DATA post to the UnkStnValue table
adb_shef_raw_checktab  :  ON      # ON checks location and ingestfilter tables
                                  # to see if data should be posted
                                  # OFF does not check location and
                                  # ingestfilter tables before posting
```

2.2 SHEFPARM File

This decoder uses the same SHEFPARM file as the IHFS SHEF decoder. This file is located on the rax in the /rfc_arc/cfg/decoders directory.

2.3 “Housecleaning" Requirements

Ensure that the purge_files script is housecleaning the directories defined by the apps_defaults tokens *adb_shef_raw_err_dir* and *adb_shef_raw_logs_dir*

3.0 User How-To

3.1 Start and Stop Scripts

Start and stop scripts have been provided to the user. These scripts use a similar concept as the start and stop scripts for the IHFS SHEF decoder. These scripts can be found in the directory /rfc_arc/scripts/decoders and are called:

start_raw_decoder
stop_raw_decoder

3.2 Parsing Errors/Warnings

The parsing portion of the shef_decode_raw program now uses the same parser as the IHFS SHEF decoder. The possible parsing warnings/errors are as follows:

1. not used
2. Two digits are required in date or time group
3. An expected parameter code is missing
4. File read error while accessing data file

5. No dot in column 1 when looking for new message
6. Dot found but not in column 1 of new message
7. Unknown message type, looking for .A, .B, or .E
8. Bad char in message type format (or missing blank delimiter)
9. Last message format was different from this continuation messg
10. Last message was NOT a revision unlike this continuation messg
11. Last message had an error so cannot continue
12. No positional data or no blank before it
13. Bad character in station id
14. Station id has more than 8 characters
15. Bad number in positional data date group
16. Incorrect number in date group
17. Incorrect number in time group
18. Missing blank char in positional data
19. Bad creation date
20. Bad date code letter after the character "D"
21. Unknown data qualifier (need E,F,R,Q,T,S,V or other additions)
22. Unknown data units code (need S or E)
23. Unknown duration code (need Y,M,D,H,N,S,Z and others)
24. Bad 2-digit number following duration code
25. Unknown time interval code (need Y,M,D,H,N,S,E)
26. Bad 2-digit number following time interval code
27. Bad character after "DR" (relative date code)
28. Bad 1- or 2-digit number in relative date code
29. Bad character in parameter code
30. Bad parameter code calls for send code
31. Trace for code other than PP, PC, PY, SD, SF, SW
32. Variable duration not defined
33. Bad character where delimiter is expected
34. Non-existent value for given type and source parameter code
35. ZULU, DR, or DI has send code QY, PY, or HY
36. Forecast data given without creation date
37. No value given after parameter code and before slash or eol
38. Explicit date for codes DRE or DIE is not the end-of-month
39. Year not in good range (1753-2199)
40. Exceeded limit of data items
41. Too many data items for given .B format
42. Not enough data items for given .B format
43. Cannot adjust forecast date to Zulu time
44. Time between 0201 & 0259 on day changing from stnd to daylight
45. No time increment specified (use DI code)
46. No ".END" message for previous ".B" format
47. ID requires 3 to 8 characters
48. For dayl savgs time, check Apr or Oct for 1976 thru 2040 only
49. Bad character in the message
50. Missing parameter code
51. Bad value chars (or missing delimiter), data may be lost
52. Bad chars in data value field
53. "?" not accepted, use "M" (or change program)
54. Parameter code is too long or too short
55. Missing delimiter between data type fields
56. Missing delimiter after data type field
57. Should use "/" instead of blank for delimiter
58. Parm codes PP and PC require decimal value
59. Abort, cannot read "shefparm" file correctly
60. Non-existent value for given duration parameter code
61. Non-existent value for given extremum parameter code

62. Non-existent value for given conversion factor parameter code
63. Non-existent value for given probability parameter code
64. Parameter code too short or field misinterpreted as param-code
65. Comma not allowed in data field, data value is lost
66. Date check for yr-mo-da shows bad date
67. No data on line identified with a message type format
68. An unexpected ".END" message was encountered
69. BUMMER!!! Maximum number of errors reached, abort message
70. Cannot output to binary shefpars file
71. Cannot access "PE conversion factors" from the "shefparm" file
72. Cannot access "send codes" from the "shefparm" file
73. Cannot access "duration codes" from the "shefparm" file
74. Cannot access "type/source codes" from the "shefparm" file
75. Cannot access "extremum codes" from the "shefparm" file
76. Cannot access "probability codes" from the "shefparm" file
77. Cannot read "SHEFPARM" file!!!!!
78. Bad character in data value, value is lost
79. Julian day should be written with 3 digits
80. Too many digits in date group!
81. Too many characters in quotes
82. Data line found before completing .B format line(s)
83. Missing slash delimiter or bad time zone code
84. Too many chars in qualifier code, data value is lost
85. Bad data qualifier, rest of format is lost
86. Retained comment found without a data value, comment is lost
87. Unexpected slash found after parameter code, before data value
88. Cannot access “qualifier codes” from the “shefparm” file
89. not used
90. Unknown error number given

3.3 Posting Warnings/Errors

Posting errors are limited to providing the Informix and ISAM error information in the daily log file. Miscellaneous information may be found in the raw.out and/or raw.err log files. These files are located in the directory /rfc_arc/logs/decoder/raw/logs and contain the information that used to be redirected into the nohup.out file.

4.0 Daily Log File

The shef_decoder_raw program generates a daily log file. The format of this log file is based on the IHFS SHEF decoder’s daily log file as much as possible. An excerpt of a daily log file follows.

```
Processing file: SRUS21KWOH.16000047.379; at 2004-04-16 00:00:58
    Header productId: KWOHRRSRHA; timeZ= 2004-04-15 23:56
    LogFile: KWOHRRSRHA.0415.235658
Parsing data.
    Parse errs/warn=   0 /   0
Posting data.
    10 records processed
Total PEDRSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PECRSEP:      9  Ins:    0  Upd:    9  NoIns:    0  NoUpd:    0
Total PEDFSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEDCSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PAIREDV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEOOSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
```

```
Total UNKSTNV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total Outside Window:     0
Net Total:        9
PEDRSEP Unk Location:     0   Unk Ingestfilter:     0
PECRSEP Unk Location:     0   Unk Ingestfilter:     0
PEDFSEP Unk Location:     0   Unk Ingestfilter:     0
PEDCSEP Unk Location:     0   Unk Ingestfilter:     0
PAIREDV Unk Location:     0   Unk Ingestfilter:     0
PEOOSEP Unk Location:     0   Unk Ingestfilter:     0
End time (elapsed parse,post): 2004-04-16 00:00:58 (00:00, 00:00)
----------
Processing file: SRUS21KWOH.16000059.442; at 2004-04-16 00:01:08
    Header productId: KWOHRRSRHA; timeZ= 2004-04-15 23:57
    LogFile: KWOHRRSRHA.0415.235708
Parsing data.
    Parse errs/warn=   0 /   0
Posting data.
    82 records processed
Total PEDRSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PECRSEP:     65  Ins:    0  Upd:   65  NoIns:    0  NoUpd:    0
Total PEDFSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEDCSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PAIREDV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEOOSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total UNKSTNV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total Outside Window:     0
Net Total:       65
PEDRSEP Unk Location:     0   Unk Ingestfilter:     0
PECRSEP Unk Location:    16   Unk Ingestfilter:     0
PEDFSEP Unk Location:     0   Unk Ingestfilter:     0
PEDCSEP Unk Location:     0   Unk Ingestfilter:     0
PAIREDV Unk Location:     0   Unk Ingestfilter:     0
PEOOSEP Unk Location:     0   Unk Ingestfilter:     0
End time (elapsed parse,post): 2004-04-16 00:01:10 (00:00, 00:02)
----------
Processing file: SRUS51KRNK.16000117.533; at 2004-04-16 00:01:20
    Header productId: KRNKRR3RNK; timeZ= 2004-04-16 00:00
    LogFile: KRNKRR3RNK.0416.000020
Parsing data.
    Parse errs/warn=   0 /   0
Posting data.
     4 records processed
Total PEDRSEP:      2  Ins:    2  Upd:    0  NoIns:    0  NoUpd:    0
Total PECRSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEDFSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEDCSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PAIREDV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEOOSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total UNKSTNV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total Outside Window:     0
Net Total:        2
PEDRSEP Unk Location:     0   Unk Ingestfilter:     0
PECRSEP Unk Location:     0   Unk Ingestfilter:     0
PEDFSEP Unk Location:     0   Unk Ingestfilter:     0
PEDCSEP Unk Location:     0   Unk Ingestfilter:     0
PAIREDV Unk Location:     0   Unk Ingestfilter:     0
PEOOSEP Unk Location:     0   Unk Ingestfilter:     0
End time (elapsed parse,post): 2004-04-16 00:01:26 (00:00, 00:06)
----------
```

5.0 Message Error Files

The shef_decoder_raw program generates message error files. The format of these files is based on the IHFS SHEF decoder's message error files as much as possible. An excerpt of this daily log file is shown below.

Example 1

```
SRUS51 KLWX 171308
RR2WBC
RIVER STAGE REPORTS FROM HTTP://WATER.USGS.GOV/NWIS
.B WBC 0417 E DH0905/HGIRG/HGRIG/HGRIP
                                ?
 ** ERROR 34 ** Non-existent value for given type and source parameter code
MTSW2 DM04170800/ 3.28//     : MT STORM
PINM2 DM04170400/ 4.11//     : PINTO
FROV2 DM04170826///   : FRONT ROYAL
COOV2 DM04170826///   : COOTES STORE
STGV2 DM04170845/// 4.58     : STRASBURG
MDLV2 DM04170703// /  : MIDDLEBURG
LEEV2 DM04170545/// 3.04     : LEESBURG
RENV2 DM04170826///   : REMINGTON
CLPV2 DM04170530/// 2.56     : CULPEPER
FDBV2 DM04170515// 3.77/     : FREDERICKSBURG
FKLW2 DM04170830// 3.05/     : FRANKLIN
CABW2 DM04170800// 5.74/     : CABINS
PETW2 DM04170800// 4.38/     : PETERSBURG
BRYW2 DM04170830// 2.20/     : BRANDYWINE
MOFW2 DM04170800// 3.31/     : SBSF MOOREFIELD
MRFW2 DM04170830// 10.45/    : SF MOOREFIELD
SPRW2 DM04170500// 5.78/     : SPRINGFIELD
BNMW2 DM04170600// 4.13/     : BARNUM
LUKM2 DM04170600// 4.28/     : LUKE
HDSW2 DM04170830// 4.98/     : HEADSVILLE
GCPW2 DM04170830// 4.65/     : CREAT CACAPON
MBGW2 DM04170800// 4.17/     : MARTINSBURG
SHEW2 DM04170430/// 8.99     : SHEPHERDSTOWN
MILW2 DM04170500// 6.83/     : MILLVILLE
KITM2 DM04170600// 4.01/     : KITZMILLER
WSTM2 DM04170415/// 4.45     : WESTERNPORT
CWCM2 DM04170400// 4.04/     : WILLS CREEK
CBEM2 DM04170400// 4.96/     : CUMBERLAND
PAWW2 DM04170530// 11.36/    : PAW PAW
HNKM2 DM04170530// 9.85/     : HANCOCK
FAVM2 DM04170415/// 4.46     : FAIRVIEW
SACM2 DM04170400/// 4.13     : SHARPSBURG
HFEW2 DM04170430/// 9.18     : HARPERS FERRY
PORM2 DM04170745/// 9.06     : PT OF ROCKS
DAWM2 DM04170430/// 2.55     : DAWSONVILLE
BRKM2 DM04170615// 6.74/     : LITTLE FALLS
BDGM2 DM04170745/// 3.50     : BRIDGEPORT
FDKM2 DM04170745// 4.62/     : FREDERICK
GTND2 DM04170430/// 4.05     : WISC AVE
SRVM2 DM04170751// 1.99/     : SAVAGE RIVER DAM
.END
NNNN

   NUMBER OF WARNINGS  ....       0
   NUMBER OF ERRORS  ......       1

   TOTAL NUMBER OF LINES ..      48
   (parsing routines: ob4-r25)
    0 records processed
```

Example 2

```
SRUS51 KLWX 121144
RR3WBC
CRW
.A SPYV2 0412 E DH06/TX 47/TN 41/TA 41/PPP 0.08/XW 61
.A KCIV2 0412 E DH07/TX 52/TN 42/TA 43/PPP 0.06/WX 61/SF 0.0/SD 0
                                                    ?
 ** ERROR 62 ** Non-existent value for given conversion factor parameter code

   NUMBER OF WARNINGS  ....       0
   NUMBER OF ERRORS  ......       1
```

```
    TOTAL NUMBER OF LINES ..       7
    (parsing routines: ob4-r25)
     9 records processed
Total PEDRSEP:      5  Ins:    2  Upd:    3  NoIns:    0  NoUpd:    0
Total PECRSEP:      2  Ins:    0  Upd:    2  NoIns:    0  NoUpd:    0
Total PEDFSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEDCSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PAIREDV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEOOSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total UNKSTNV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total Outside Window:     0
Net Total:        7
PEDRSEP Unk Location:     0   Unk Ingestfilter:     0
PECRSEP Unk Location:     0   Unk Ingestfilter:     0
PEDFSEP Unk Location:     0   Unk Ingestfilter:     0
PEDCSEP Unk Location:     0   Unk Ingestfilter:     0
PAIREDV Unk Location:     0   Unk Ingestfilter:     0
PEOOSEP Unk Location:     0   Unk Ingestfilter:     0
```

6.0 Posting Summary Information

The posting summary information that appears in both the daily log file and the messages error files can be broken into three parts, these are: part 1 - status of posting to each of the various “raw” data value tables, part 2 - misc. totals, and part 3 - general summary information indicating why recoded was not posted

Part 1

```
Total PEDRSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PECRSEP:     65  Ins:    0  Upd:   65  NoIns:    0  NoUpd:    0
Total PEDFSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEDCSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PAIREDV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total PEOOSEP:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
Total UNKSTNV:      0  Ins:    0  Upd:    0  NoIns:    0  NoUpd:    0
```

Part 2

```
Total Outside Window:     0
Net Total:       65
```

Part 3

```
PEDRSEP Unk Location:     0   Unk Ingestfilter:     0
PECRSEP Unk Location:    16   Unk Ingestfilter:     0
PEDFSEP Unk Location:     0   Unk Ingestfilter:     0
PEDCSEP Unk Location:     0   Unk Ingestfilter:     0
PAIREDV Unk Location:     0   Unk Ingestfilter:     0
PEOOSEP Unk Location:     0   Unk Ingestfilter:     0
```

Part 1

This part currently consists of seven lines, one line for each of the tables the shef_decode_raw program currently can post to. Each row consists of five values.

Column 1 indicates the total number of rows inserted and/or updated to this table.
Column 2 indicates the total number of rows inserted.
Column 3 indicates the total number of rows updated.
Column 4 indicates the total number of rows where insert was attempted but failed.
Column 5 indicates the total number of rows where update was attempted but failed.
Columns 4 and 5 should always have zero totals.

Part 2

Row 1 indicates the number of records where the observation time was outside the window defined by the apps_defaults tokens *adb_shef_winpast & adb_shef_winfuture.*
Row 2 indicates the total number of records posted for all the tables.

Part 3

Similar to part 1, this part currently consists of six lines, one line for each of the tables the shef_decode_raw program currently can post to. It does not include information for the unkstnvalue table as the posting to that table is controlled by the apps_defaults token *adb_shef_raw_post_unk*. Each row consists of two values.

Column 1 indicates the total number of records that could not be posted to that table because the lids were not in the location table.
Column 2 indicates the total number of records that could not be posted to that table because the lid and/or SHEF pedtse code was not in the ingestfilter table.

7.0 Troubleshooting Information

Check the raw.out, raw.err, daily log and message error files. If the user cannot determine the source of the problem by viewing these files, contact the RFC Support Group for assistance.

8.0 Maintenance Information

Originating Programmer/Office: Toth, Monica
NWS/OHD/HL
Silver Spring, MD

Maintenance programmer/Office: OHD/HL
Silver Spring, MD

Documentation: Meyer, Juliann
Missouri Basin River Forecast Center
Pleasant Hill, MO

8.0 References

NWS Directive 10-942 Standard Hydrometeorological Exchange Format (SHEF) Manual

RFC Archive DB Team Request for Change to SHEF submitted February 28, 2002.

Website with information on SHEF and the IHFS shefdecoder application
http://www.nws.noaa.gov/os/whfs/shef.shtml